situations in which each transparent substrate spans across the region for only a single channel.

FIGS. 17A-17F illustrate another fabrication technique for obtaining a stack similar to the stack **321** of FIG. **15**F. In this case, as shown in FIG. **16**A, multiple singulated transmissive substrates **312** are mounted on a sacrificial substrate **410**. As before, the transmissive substrates **312** can be composed, for example, of glass, sapphire or a polymer that is transparent to the wavelength(s) of interest (i.e., the wavelength(s) of light emitted by the light emitting devices **76**A and detectable by the light detecting devices **76**B). A combined replication and vacuum injection tool **400**A is provided, and a curable epoxy material is dispensed on the replication features **402** of the tool, which then is brought into contact with the exposed surfaces of the transmissive substrates **312** to form replicated lens elements **310** as shown in FIG. **17**B. The epoxy material then is hardened, for example, by thermal or UV curing. Also, spaces **404** between the tool **400**A and the sacrificial substrate **410**, as well as spaces **406** between the tool **400**A and the transmissive substrates **312**, are filled with a non-transparent material such as a flowable polymer material (e.g., epoxy, acrylate, polyurethane, or silicone) containing a non-transparent filler (e.g., carbon black, a pigment, an inorganic filler, or a dye). See FIG. **17**B. The non-transparent material subsequently can be hardened (e.g., by UV or thermal curing) to form wall features **416** and spacer features **418**. The tool **400**A and the sacrificial substrate **410** then are removed. The resulting structure **420** ((comprising the transmissive substrates **312**, the lenses **310**, the spacer features **418** and the wall features **416**) is illustrated in FIG. **17**C.

The structure **420** then is mounted on a substrate wafer **320** (e.g., a PCB wafer) on which are mounted optoelectronic devices (i.e., light emitting devices **76**A and light detecting devices **76**B), as shown in FIG. **17**D. A second combined replication and vacuum injection tool **400**B can be used to form lenses on the second side of the transmissive substrates **312**, baffle features and upper portion of the wall features **416**. A curable epoxy material is dispensed on replication features **422** of the tool **400**B, which then is brought into contact with the exposed surfaces of the transmissive substrates **312** to form replicated lens elements **310**B as shown in FIG. **17**E. The epoxy material can be hardened, for example, by thermal or UV curing. Also, spaces **424** between the tool **400**B and the previously-formed sections **416** of the wall features, as well as spaces **426** between the tool **400**B and the transmissive substrates **312**, are filled with a non-transparent material such as a flowable polymer material (e.g., epoxy, acrylate, polyurethane, or silicone) containing a non-transparent filler (e.g., carbon black, a pigment, an inorganic filler, or a dye). See FIG. **15**. The non-transparent material subsequently can be hardened (e.g., by UV or thermal curing) to form the upper sections **416**B of wall features **416** and to form baffle features **428**. The second tool **400**B then can be removed. The resulting structure **421**, which is illustrated in FIG. **17**F, is similar to the structure **321** of FIG. **15**F obtained from the process of FIGS. **15**A-**15**F. The structure **421** of FIG. **17**F also can be separated (e.g., by dicing) along lines **322** into multiple modules, each of which includes a light emitting device **76**A and a light detecting device **76**B in respective optical channels.

As noted above, if dicing is performed as shown in FIG. **15**F or **14**F, the exterior sidewalls **326** of the transparent covers **312** of the resulting modules will not be covered with a transparent material (see, e.g., FIG. **16**), which could allow light leakage from the module and/or stray light into the module to occur in some cases. A technique for providing non-transparent material to cover the sidewalls of the transparent covers is now described.

One way in which the sidewalls **326** of the transmissive covers **312** can be covered with non-transparent material is illustrated by FIGS. **15**A-**15**B. Starting, for example, with the structure **321** of FIG. **15**F (or the structure **421** of FIG. **17**F), openings (e.g., trenches) **510** are formed from the top each baffle feature (e.g., **318**) through the underlying transmissive substrates **312**, as shown in FIG. **18**A. The trenches **510** should extend entirely through the thickness of the transmissive substrates **312** and, preferably, should extend partially into spacer features (e.g., **316**) below. The trenches **510** can be formed, for example, by dicing, micromachining or laser cutting techniques. The trenches **510** subsequently can be filled with a non-transparent material **512** using, for example, a vacuum injection technique so as to provide a non-transparent layer on the side edges of the various portions of the transmissive substrates **312**. See FIG. **18**B. The vacuum injection technique can involve placing a PDMS tool on the top of the structure shown in FIG. **18**A. The non-transparent material **512** covering the side edges of the transmissive substrates **312** can be, for example, a curable polymer material (e.g., epoxy, acrylate, polyurethane, or silicone) containing a non-transparent filler (e.g., carbon black, pigment, or dye). The structure **520** of FIG. **18**B then can be separated (e.g., by dicing) into multiple individual modules.

For example, as illustrated in FIG. **19**, the structure **520** can be separated by dicing along lines **522** through the wall features **416**, **416**B to form modules like the module **530** of FIG. **20**. The module **530** includes a light emitting device **76**A and a light detecting device **76**B separated from one another by a spacer **418** that serves as a non-transparent interior wall. Non-transparent material **512** also separates the transmissive substrates **312** form one another to help prevent stray light from entering the optical detection channel. The exterior walls **416** of the module also are composed of non-transparent material and cover the exterior sidewalls **326** of the transmissive covers **312**, which can help prevent light leakage from the sides of the transmissive covers. The structure **321** of FIG. **15**F can be processed in a similar manner to obtain multiple modules similar to the module of FIG. **20**.

In some implementations, instead of separating the structure **520** along dicing lines **522** as in FIG. **19**, the structure **520** can be separated along dicing lines **524** passing through the non-transparent material **512** and the spacers **418** (see FIG. **21**) to form light modules like the module **540** of FIG. **22**. The module **540** also includes a light emitting device **76**A and a light detecting device **76**B separated from one another by an interior wall **416** that can help prevent stray light from entering the optical detection channel. The outer walls of the module are composed of non-transparent spacers **418** and non-transparent material **512** that covers the exterior sidewalls **326** of the transmissive covers **312**. The non-transparent material **512** can help prevent light leakage from the sides of the transmissive covers **312**. The structure **321** of FIG. **15**F can be processed in a similar manner to obtain multiple modules similar to the module of FIG. **22**.

Although many of the foregoing examples include lenses as the optical elements, some implementations may include other types of optical elements (e.g., optical filters and/or FFL correction layers) in addition to, or in place of, the lenses. In some cases, such optical elements may be provided on a transparent substrate (e.g., wafer) prior to singulation. For example, in some cases, an optical filter layer